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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

CHACKO DAVIS, DABORAH

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 08/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/786,592

Applicant(s)

PARK ET AL.

Examiner

Daborah Chacko-Davis

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 15 and 16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>07/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of claims 1-14, in the reply filed on May 19, 2006, is acknowledged. The traversal is on the ground(s) that the negative pattern of carbon nanotubes recited in the non-elected claim 15 cannot be formed by plasma etching. This is not found persuasive because the negative pattern of carbon nanotubes can be formed by a materially different process such as the selective deposition of carbon nanotubes.

The requirement is still deemed proper and is therefore made FINAL.

Claims 15-16, are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 9-11, 13-14, are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 5,691,101 (Ushirogouchi et al., hereinafter referred to as Ushirogouchi).

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Ushirogouchi, in col 2, lines 58-67, in col 3, lines 1-4, and lines 32-36, in col 6, lines 49-67, in col 7, lines 1-4, in col 8, lines 26-67, in col 9, lines 19-51, in col 11, lines 1-15, discloses a photosensitive composition that comprises a photoresist and is subjected to an exposure process so as to form a fine pattern of the powder (carbon nanotube powder), the method includes dispersing the carbon nanotube powder in a photosensitive composition that includes an organic solvent, a thermal hardener such as a phenolic resin, and a crosslinkable resin such as an anhydride wherein the dispersed powder is surface modified by the resin component of the photosensitive composition (diffusion of the resin into the powder particle). Ushirogouchi, in col 3, lines 1-4, in col 6, lines 1-67, in col 8, lines 1-67, in col 10, lines 6-64, col 14, lines 5-34, discloses that the photosensitive composition comprising the acid generator, the resin and the carbon nanotube particle powder is coated onto a substrate, followed by heating the coated substrate (to vaporize the solvent, preheating) to form a resist layer, performing exposure to ultraviolet radiation (exposure to UV inherently causes polymerization i.e., generates acid upon exposure, followed by crosslinking etc), performing a post exposure baking process (heat curing) so as to form polymerized portion of the powder (carbon nanotube composite) (blanket exposure and post heating causes polymerization of the entire exposed portion of the photosensitive composition) (claim 9). Ushirogouchi, in col 7, lines 1-45, in col 8, lines 20-22, and lines 25-67, in col 9, lines 19-21, discloses that the carbon nanotubes powder is present in the composition in an amount of about 1 to 98 wt% of the total solid content in the composition, and the thermal hardener (phenolic resin) is at least about 20 wt% of the

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total solid content in the composition (claim 10). Ushirogouchi, in col 9, lines 42-51, discloses that the organic solvent employed includes cyclohexanone (claim 11).

Ushirogouchi, in col 8, lines 21-22, discloses that the anhydride resin component is about 10 to 95 wt % of the total solid contents (such as carbon nanotube powder) in the composition (claim 13). Ushirogouchi, in col 7, lines 20-45, discloses that the photosensitive composition includes (polyacetal) acetal resins (polymeric binder) in an amount of at least 20 wt % of the total composition (claim 14).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-2, 4, 6-8, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,691,101 (Ushirogouchi et al., hereinafter referred to as Ushirogouchi) in view of U. S. Patent No. 6,872,503 (Wheland et al., hereinafter referred to as Wheland).

Ushirogouchi, in col 2, lines 58-67, in col 3, lines 1-4, and lines 32-36, in col 6, lines 49-55, in col 8, lines 26-67, in col 9, lines 19-51, in col 11, lines 1-15, discloses a photosensitive composition that comprises a negative resist and is subjected to an exposure process so as to form a fine pattern of the powder (carbon nanotube powder), the method includes dispersing the carbon nanotube powder in a photosensitive

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composition that includes an organic solvent, an acid generator, a crosslinkable resin such as an anhydride, wherein the dispersed powder is surface modified by the resin component of the photosensitive composition (diffusion of the resin into the powder particle). Ushirogouchi, in col 3, lines 1-4, in col 6, lines 1-67, in col 8, lines 1-67, in col 10, lines 6-64, col 14, lines 5-34, discloses that the photosensitive composition comprising the acid generator, the resin and the carbon nanotube particle powder is coated onto a substrate, followed by heating the coated substrate (to vaporize the solvent, preheating) to form a resist layer, performing exposure to ultraviolet radiation through a mask (photomask, exposure to UV inherently causes polymerization i.e., generates acid upon exposure, followed by crosslinking etc), performing a developing process in a developer so as to form a negative pattern (unexposed areas are removed upon developing) of the carbon nanotube powder (claim 1). Ushirogouchi, in col 6, lines 36-41, in col 8, lines 64-67, and in col 22, line 1, and lines 48-51, discloses that the photosensitive composition includes 14 to 98 parts by weight of carbon nanotube powder, and about 0.01 to 20 parts by weight of acid generator (claim 2). Ushirogouchi, in col 9, lines 42-51, discloses that the organic solvent employed includes cyclohexanone (claim 4). Ushirogouchi, in col 8, lines 21-22, discloses that the resin component (anhydride) is about 10 to 95 wt % of the total solid components (such as carbon nanotube powder) in the composition (claim 6). Ushirogouchi, in col 6, lines 53-67, in col 7, lines 1-67, discloses that the photosensitive composition includes acetal resins such as phenolic resins (claim 7). Ushirogouchi, in col 10, lines 22-24, discloses

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that after the exposure, post exposure baking is performed on the exposed resist layer (claim 8).

The difference between the claims and Ushirogouchi is that Ushirogouchi does not disclose that the developer is an organic developer.

Wheland, in col 14, lines 43-55, discloses that the resist is developed using an organic solvent.

Therefore, it would be obvious to a skilled artisan to modify Ushirogouchi by employing the organic solvent suggested by Wheland as the developing agent because Wheland, in col 14, lines 59-64, discloses that an organic solvent is used as the developer for negative-working photoresists and Ushirogouchi employs negative resists as the photosensitive composition.

6. Claim 3, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,691,101 (Ushirogouchi et al., hereinafter referred to as Ushirogouchi) in view of U. S. Patent No. 6,872,503 (Wheland et al., hereinafter referred to as Wheland) as applied to claims 1-2, 4, 6-8, above, and further in view of U. S. Patent No. 6,033,740 (Oelbrandt et al., hereinafter referred to as Oelbrandt).

Ushirogouchi in view of Wheland is discussed in paragraph no. 5.

The difference between the claim and Ushirogouchi in view of Wheland is that Ushirogouchi in view of Wheland does not disclose that the liquid coating composition includes a photo intensifier as recited in claim 3.

Oelbrandt, in col 4, lines 32-62, in col 5, lines 1-9, discloses that the polymerization initiator such as anthracene is present in the amount of at least 2% by weight of the photosensitive composition.

Therefore, it would be obvious to a skilled artisan to modify Ushirogouchi in view of Wheland by employing the polymerization initiator suggested by Oelbrandt because Oelbrandt, in col 5, lines 63-67, in col 6, lines 1-9, discloses that the polymerization initiators generate cationic species upon irradiation due to absorption of the irradiated wavelengths, and that the initiators also catalyze polymerization reactions.

7. Claim 5, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,691,101 (Ushirogouchi et al., hereinafter referred to as Ushirogouchi) in view of U. S. Patent No. 6,872,503 (Wheland et al., hereinafter referred to as Wheland) as applied to claims 1-2, 4, 6-8, above, and further in view of U. S. Patent No. 6,777,159 (Itatani et al., hereinafter referred to as Itatani).

Ushirogouchi in view of Wheland is discussed in paragraph no. 5.

The difference between the claim and Ushirogouchi in view of Wheland is that Ushirogouchi in view of Wheland does not disclose that the liquid coating composition includes a coupling agent as recited in claim 5.

Itatani, in col 9, lines 10-17, and lines 21-22, and lines 26-28, discloses that the photosensitive polyimide composition includes coupling agents such as aminopropyltriethoxysilane in an amount of 2% by weight of the polyimide composition.

Therefore, it would be obvious to a skilled artisan to modify Ushirogouchi in view of Wheland by employing the silane coupling agent, suggested by Itatani, in the photosensitive composition because Itatani, in col 9, lines 10-28, discloses that including the claimed coupling agent in the photosensitive polyimide composition improves the adhesion of the polyimide composition to the substrate surface, making it possible to use the polyimide composition as a photolithographic material.

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,691,101 (Ushirogouchi et al., hereinafter referred to as Ushirogouchi) in view of U. S. Patent No. 6,777,159 (Itatani et al., hereinafter referred to as Itatani).

Ushirogouchi is discussed in paragraph no. 3.

The difference between the claims and Ushirogouchi is that Ushirogouchi does not disclose that the liquid coating composition includes a coupling agent as recited in claim 12.

Itatani, in col 9, lines 10-17, and lines 21-22, and lines 26-28, discloses that the photosensitive polyimide composition includes coupling agents such as aminopropyltriethoxysilane in an amount of 2% by weight of the polyimide composition.

Therefore, it would be obvious to a skilled artisan to modify Ushirogouchi in view of Wheland by employing the silane coupling agent, suggested by Itatani, in the photosensitive composition because Itatani, in col 9, lines 10-28, discloses that including the claimed coupling agent in the photosensitive polyimide composition

improves the adhesion of the polyimide composition to the substrate surface, making it possible to use the polyimide composition as a photolithographic material.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

August 4, 2006.



**JOHN A. MCPHERSON
PRIMARY EXAMINER**